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REMARKS

The Office Action of May 11, 2001 has been received and carefully reviewed. It is submitted that, by this Amendment, all bases of rejection and objection are traversed and overcome. Upon entry of this Amendment, Claims 1 and 3-22 remain in the application. Claim 2 has been canceled. Reconsideration of the claims is requested.

The specification stands objected to for various informalities. It is submitted that, by this Communication, these informalities have been corrected.

The claims stand objected to for various informalities. It is further submitted that, by this Communication, these informalities have been corrected.

Claims 1-9 and 11-22 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Kashiwaya et al. (U.S. Patent No. 5,595,792).

The Examiner stated that regarding Claim 1, Kashiwaya et al. teach a process for the surface treatment of at least one electrically conducting substrate or a substrate that has been coated so as to be conducting (Col. 7, lines 66-67, and Col. 8, lines 1-4), by means of a gas placed in the region of an electric discharge (Figure 1 and Col. 3, lines 10-25), wherein the discharge zone is restricted on at least two opposite sides by surfaces to be treated (Figure 1 and Col. 3, lines 32-41). Specifically, Kashiwaya et al. teach the continuous surface treatment of a web-like substrate with plasma in the production of a magnetic recording medium. The Examiner admits that Kashiwaya et al. does not explicitly teach **that the web-like substrate forms a hollow cathode**. However, the Examiner states that the substrate "is made to run along one face of the sheet-shaped plasma stream and then returns to run along the other face of the plasma stream to thereby obtain a state in which the substrate is arranged opposite to the plasma stream, and at the same time, an envelope space obtained by enclosing the plasma stream with the substrate is formed..." (Col. 3, lines 34-40) (i.e., the Examiner asserts that the plasma is confined in a hollow area defined by the substrate).

Claim 10 stands rejected under 35 U.S.C. 103 (a) as being unpatentable over Kashiwaya et al. (I) ('792) in view of Kashiwaya et al. (II) ('335) or Hudgens et al. ('379).

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Claims 1-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Echizen et al (USPN 5,527,391). The Examiner stated that Echizen et al. teach a process for the surface treatment of at least one electrically conducting substrate or a substrate that has been coated so as to be conducting (Abstract and Col. 28, lines 58-61), by means of a gas placed in the region of an electric discharge (Col. 35, lines 53-55, and Col. 10, lines 25-44), wherein the discharge zone is restricted on at least two opposite sides by surfaces to be treated (Figure 1 and Abstract). Specifically, Echizen et al. teach the continuous surface treatment of an electrically conductive band-shaped substrate forms a hollow cathode. The Examiner further asserted that the moving substrate confines the plasma discharge region to a hollow area (Figure 1).

Claims 1 and 14 have been revised to recite that the substrate surfaces are treated by a hollow-cathode glow discharge. Support for this recitation comes from the subject matter of canceled claim 2, and from the specification as filed at page 2, line 24.

Applicants respectfully disagree with the Examiner's assertion that "the plasma is confined in a hollow area defined by the substrate." According to Kashiwaya I, a plasma, eg. Ar-plasma, is formed in a plasma stream generating device 24, which is not located between the substrate layers 21, and blown through the gap between these layers (see Fig. 2 and corresponding description).

Further, Kashiwaya I applies a bias voltage to the surface of the substrate 21 thereby promoting film forming (Col. 6, lines 47-56). However, this bias voltage is only used for activation of the ionization/excitation of the reactive gas, eg. hydrocarbons (Col. 2, lines 42-53, Col. 4, lines 7-9, etc.) but not for plasma generation.

Thus, Kashiwaya does not teach or suggest using the substrate as electric discharge electrodes to generate a hollow cathode glow discharge process between the substrate sheets, eg. using the voltage of the substrate sheets for plasma generation as well. Therefore, in Applicants' invention as defined in amended claims 1 and 14, and contrary to Kashiwaya et al., there is no need for any plasma gun.

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It is further respectfully submitted that "hollow cathode" is a technical term of art, which has been misinterpreted by the Examiner. In order to clarify this, attached hereto as Exhibit 1 is an excerpt entitled "Basic Mechanisms Contributing to the Hollow Cathode Effect," G. Schaefer and K.H. Schoenbach, pages 55-59, NATOASI series: Advanced Science Institutes Series, (1990), H. 219. This term does not mean only a hollow electrode, but rather a very specific type of discharge known by the skilled artisan. The term hollow cathode is used in connection with this special hollow cathode effect. Although Kashiwaya discloses a hollow bias voltage electrode, this would not be termed "hollow cathode."

As such, since Kashiwaya does not teach or disclose a hollow-cathode glow discharge, it is submitted that Applicants' invention as defined in claims 1 and 14, as well as in all claims dependent therefrom, is not anticipated, taught or rendered obvious by Kashiwaya, either alone or in combination, and patentably defines over the art of record.

With regard to Echizen et al., the electrically conductive substrate is used as electrode for applying a bias voltage (Col. 28, line 4, Col. 26, lines 32-34, etc.) Again, the substrate is not used to initiate plasma generation as in a hollow cathode discharge process.

In summary, Kashiwaya I and II and Echizen only disclose generating a plasma separately and to apply a bias voltage to the substrate for activation of the reactive gas but not for plasma generation. Due to this different method, not only is the deposition rate much lower, but contrary to Applicants' invention as defined in claims 1 and 14, all parts of the device will be contaminated by deposition of reactants because the plasma is generated separately and not completely confined between the substrate sheets.

As such, it is submitted that Applicants' invention as defined in claims 1 and 14, as well as in all claims dependent therefrom, is not anticipated, taught or rendered obvious by Echizen, either alone or in combination, and patentably defines over the art of record.

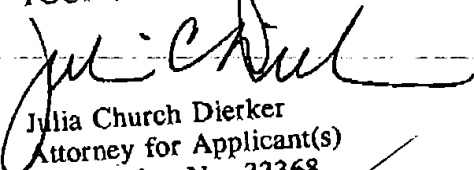
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In summary, claims 1 and 3-22 remain in the application. Claim 2 has been canceled. It is submitted that, through this amendment, Applicants' invention as set forth in these claims is now in a condition suitable for allowance.

Further and favorable consideration is requested. If the Examiner believes it would expedite prosecution of the above-identified application, he is cordially invited to contact Applicant's Attorney at the below-listed telephone number.

Respectfully submitted,

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**VERSION OF CLAIM AMENDMENTS WITH MARKINGS
TO SHOW CHANGES MADE**

In the Specification:

Page 1, between lines 1 and 2, after the title, insert the heading

--BACKGROUND OF THE INVENTION--.

Page 2, between lines 9 and 10, after the paragraph ending with

"dislodged chips." insert the heading --SUMMARY OF THE INVENTION--.

Page 2, please delete in its entirety the paragraph appearing at lines 16-18, beginning with "This task" and ending with "of the invention."

Page 2, line 26, please delete "[sic, prism]" and insert --or prism--.

Page 4, between lines 5 and 6, after the paragraph ending with

"can be maintained." insert the heading --BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 4, between lines 15 and 16, after the paragraph ending with

"deflecting element." insert the heading --DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--.

Page 6, line 30, please delete "Claims" and insert --What is

claimed is--.

In the Claims:

1. (Amended) A process [Process] for surface treatment of at least one electrically conducting substrate [(1)] or a substrate that has been coated so as to be electrically conducting, the process comprising the steps of:

[by means of] placing a gas [placed] in [the] a region of an electric discharge[.];

[wherein] restricting the discharge region [zone (2)] [is restricted] on at least two opposite sides by surfaces to be treated [(7), characterized in that],

wherein the one or more substrates [(1)] form a hollow cathode; and

treating the substrate surfaces by a hollow-cathode glow discharge.

Please cancel claim 2 without prejudice.

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3. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein one or more continuously supplied substrates [(1) can be] are fed to restrict the discharge region [(2),] in at least [in] some areas of the region [regions].
4. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein the substrates are band-shaped [substrates are treated].
5. (Twice Amended) [Process] The process according to claim 3[, characterized by the fact that] further comprising the step of:
turning at least one of the substrates [(1) supplied is turned] at least once to change the direction of movement;
wherein [and] the discharge region [(2)] is restricted on at least one side by an area of the substrate [regions] before the turn [(5)] in the direction of movement, and on at least one other side by an area of the substrate [regions] after the turn [(5)] in the direction of movement.
6. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein the discharge region [(2)] is restricted on two sides by substrate surfaces at a distance of 1 mm to 50 cm apart.
7. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein the electric discharge occurs at a pressure between 0.01 mbar and 100 mbar.
8. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein at least one substrate [(1)] is grounded.

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9. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein the voltage applied between at least one substrate [(1)] and a plasma formed by electric discharge is 1 V - 3000 V.

10. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein the discharge is [activated or] supported by microwaves.

11. (Twice Amended) [A] The process according to claim 1[, characterized by the fact that] wherein the discharge is activated [or supported] by a [dc] DC voltage, a pulsed [dc] DC voltage, or a low-, intermediate-, or high-frequency [ac] AC voltage.

12. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein gas is fed into one of the discharge region [(2) or] and immediately outside [it] the discharge region.

13. (Twice Amended) [Process] The process according to claim 1[, characterized by the fact that] wherein gas is removed from one of the discharge region [(2) or] and immediately outside [it] the discharge region.

14. (Twice Amended) [Device] A device for surface treatment of at least one electrically conducting substrate or a substrate that has been coated so as to be electrically conducting. the device comprising:

[implementing the process according to claim 1, with:] at least one substrate [(1) that defines] defining a discharge region [(2)] enclosed on at least two sides by substrate surfaces [(7).];

[a device] means for supplying electrical energy to the discharge region[.];

a vacuum chamber to enclose the discharge region[, a];

means [(3)] for supplying gas to the vacuum chamber[, a];

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means [(4)] for removing gas from the vacuum chamber; and an anode placed in the region of the at least one substrate [(1)]; wherein [and in that] the at least one substrate [(1)] forms a hollow cathode; and wherein the at least one substrate is surface treated by a hollow-cathode glow discharge.

15. (Amended) [Device] The device according to [Claim] claim 14[, characterized by the fact that] wherein substrate-cooling is provided.

16. (Twice Amended) [Device] The device according to [Claims 14] claim [1] 14[, characterized by the fact that] wherein gas supply [(3)] is arranged in one of the discharge region [(2) or] and immediately outside [it] the discharge region.

17. (Twice Amended) [Device] The device according to claim 14[, characterized by the fact that] wherein gas removal [(4)] is arranged in one of the discharge region [(2) or] and immediately outside [it] the discharge region.

18. (Twice Amended) [Device] The device according to claim 14[, characterized by the fact that] wherein at least one substrate [(1)] is a continuously running band [that can] adapted to be unwound from a first spool and adapted to be wound onto a second spool.

19. (Twice Amended) [Device] The device according to [Claim] claim 18[, characterized by the fact that] wherein the [spools] first spool and the second spool are arranged outside the vacuum chamber, and the band [can] is adapted to be introduced into and removed from the vacuum chamber by vacuum locks.

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20. (Twice Amended) [Device] The device according to [Claim] claim 18[, characterized by the fact that] wherein the [spools] first spool and the second spool are arranged inside the vacuum chamber.

21. (Twice Amended) [Device] The device according to claim 14[, characterized by the fact that] wherein in the vacuum chamber, in the region of the sides of the discharge region [(2)] not restricted by the substrate surfaces [(7)], deflection elements are arranged that are electrically isolated from the device components and at least one substrate [(1)].

22. (Twice Amended) [Device] The device according to claim 14[, characterized by the fact that] wherein in the vacuum chamber, deflection elements are arranged in the regions of device components in which parasitic discharges could be formed due to their potentials, or around the substrate [(1)] and the discharge region [(2)], and [that] wherein these deflection elements are electrically isolated from the device components and the substrate [(1)].

In the Abstract:

Page 9, line 2, delete "The invention concerns a" and insert --A--.